REMARKS

Claims 1, and 3-19 are now pending in this application of which claims 1, 3, 11 and 15 are being amended, and claim 2 is being cancelled.

Claims 1 and 15 are being amended to include the limitations of claim 2. Claim 11 to add plurality of first vanes and a plurality of second vanes, and claim 3 to correct dependency. The claim amendments are fully supported by the Specification and add no new matter. Thus entry of the claim amendments is respectfully requested.

Claim Rejections under 35 U.S.C. § 103(a)

To establish a *prima facie* case of obviousness under 35 U.S.C. 103(a), there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of the different references. Second, there must also be a reasonable expectation of success for such a combination. Also, the prior art references that are combined must teach or suggest all the claim limitations. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). "In making the assessment of differences between the prior art and the claimed subject matter, section 103 specifically requires consideration of the claimed invention 'as a whole.'" Princeton Biochemicals, Inc. v. Beckman Coulter, Inc. (Fed. Cir., No. 04-1493, 6/9/05). "[S]imply identifying all of the elements in a claim in the prior art does not render a claim obvious. Ruiz v. A.B. Chance Co., 357 F.3d 1270, 1275 (Fed. Cir. 2004). Instead, § 103 requires some suggestion or motivation in the prior art to make the new combination. In re Rouffet, 149 F.3d 1350, 1355-56 (Fed. Cir. 1998). In determining the differences between the prior art and the claims, the question under 35 U.S.C. §103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. Stratoflex, Inc. v. Aeroquip Corp., 713 F. 2d 1530, 218 USPQ 871 (Fed. Cir. 1983). The benefits of the claimed invention should be viewed without the benefit of impermissible hindsight vision afforded by the claims themselves.

1. The Examiner rejected claims 1-6 and 8 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. in view of U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.").

However, the combination of Murugesh et al. and Halsey et al. do not support a prima facie obviousness rejection of claim 1, as amended, which is to a gas distributor comprising a baffle extending radially outward from a hub, and having a plurality of first vanes on the first surface of the baffle that each comprise an arcuate plate that curves outward from the hub to the outer perimeter of the baffle, and second vanes on a second surface of the baffle. The first vanes direct the received gas across a chamber surface and the second vanes direct the received gas across the second surface of the baffle.

Murugesh et al. does not teach a baffle having first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle. Instead Murugesh et al. teaches "[t]he baffle surface 251 may have a topography that is, for example, substantially planar, ridged, concave or convex shaped." (Col. 6, lines 48 to 50.) This configuration of the baffle surface 251, as shown in Figure 2a of Murugesh et al., is not the same as the claimed plurality of first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle, as recited in claim 1. Specifically, Murugesh et al. does not teach or suggest arcuate plates curving outward from a hub of the baffle. Instead, Murugesh et al. teaches and shows triangular ridges on the baffle surface which are not arcuate plates.

Further, as acknowledged by the Examiner, Murugesh et al. does not teach second vanes on the second surface of the baffle that direct the received gas across the second surface of the baffle. Instead, Murugesh et al. teaches the gas distributor having a single surface 215 with ridges 245. As seen from Figure 2A, the underside opposing surface to the surface 251 with the ridges 245, has no further

ridges. Thus, Murugesh et al. does not teach second vanes on the second surface of the baffle as claimed in claim 1.

Halsey et al. fails to make up for the deficiencies of Murugesh et al. because Halsey et al. also does not teach or suggest first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle. Halsey et al. also does not teach the claimed second vanes on the second surface of the baffle. Instead, Halsey et al. teaches a diffuser with guide vanes on one surface of the diffuser and a smooth and flat surface on the opposing side of the diffuser. (Halsey et al., Figures 4A and 4B.)

Consequently, the combination of Murugesh et al. and Halsey et al. do not teach or suggest claim 1 as a whole. Neither of the cited references teach a gas distributor comprising a baffle structure having a first surface with a plurality of first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle, and a second surface having second vanes.

Furthermore, the combination of Murugesh et al. and Halsey et al. also do not provide any suggestion or motivation that would allow one of ordinary skill in the art to derive the claimed gas distributor structure recited in claim 1. As explained in the Specification, the claimed gas distributor has first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on one of its surfaces. The gas distributor also has second vanes to flow gas across the second surface of the baffle so that the gas flows uninhibited into the process chamber. The flow of gas across the second surface of the baffle cleans this surface; and thus, the claimed gas distributor is self cleaning. This self-cleaning action is especially useful as the second surface is susceptible to the build-up of process residues because it generally faces the substrate in the chamber, and thus, is more proximate to a process zone in which processes residues are formed in the chamber. This is a significant advantage over prior art gas distributors which allow build-up of residues on surfaces exposed to the

plasma or process gas environment in the chamber, and do not provide a directed flow stream of cleaning gas. The combination of Murugesh et al. and Halsey et al. simply does not provide any suggestion or motivation that would allow one of ordinary skill in the art to derive the advantages of a gas distributor structure having first and second vanes on opposing surfaces, as recited in claim 1.

For these reasons, the combination of Murugesh et al. and Halsey et al. does not provide a prima facie obviousness rejection of claim 1 or the claims dependent therefrom. Accordingly, the Examiner is respectfully requested to allow claim 1 and the claims dependent therefrom.

2. The Examiner further rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. in view U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.") as applied to claim 1 and further in view of U.S. Published Application No. 2003/0116278 issued to Wheat et al..

Claim 7 depends upon claim 1 and is patentable for the same reasons as claim 1, namely Murugesh et al. in view of Halsey et al., does not render claim 1 obvious, as the cited references do not teach or suggest the claimed invention.

Wheat et al. fails to make up for the deficiencies of Murugesh et al. and Halsey et al. because Wheat et al. also does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the opposing second surface of the baffle. Instead, Wheat et al. teaches "...an angular gas baffle or deflector 34 which is show in FIG.1 as having an open generally trapezoidal or 'hooded' configuration or shape." (Wheat et al., paragraph [0032], lines 1-4.) Further, the gas baffle in Wheat et al. has smooth surfaces without any vanes. (Wheat et al., Figs. 1 and 2.) Also Wheat et al. does not teach a baffle comprising a first surface with "first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle", as in claim 1. Nor does Wheat et al. teach

second vanes on the second surface of the baffle that comprise a plurality of wedges, as recited in claim 7.

Therefore, the combination of Murugesh et al., Halsey et al. and Wheat et al. do not provide any suggestion or motivation to direct one of ordinary skill to derive the gas distributor of independent claim 1, or that of claim 7. Thus, claim 7 is patentable over Murugesh et al. in view of Halsey et al. and Wheat et al.. Accordingly, the Examiner is respectfully requested to allow claim 7.

3. The Examiner further rejected claims 9 and 15-19 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. in view of U.S. Patent No. 6,663,025 issued to Halsey et al. as applied to claim 1 and further in view of U.S. Published Application No. 2004/0200412 issued to Frijlink.

Claim 9 depends upon claim 1 and is patentable for the same reasons as claim 1, namely Murugesh et al. in view of Halsey et al. does not render claim 1 obvious, as the cited references do not teach or suggest claim 1.

Frijlink fails to make up for the deficiencies of Murugesh et al. and Halsey et al. because Frijlink also does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the opposing second surface of the baffle. Instead, Frijlink teaches a process chamber with isolation means to "prevent the reactive gases from flowing into spaces of the reactor other than the space immediately above the substrate holders and the wafers." (Frijlink, paragraph [0027], lines 1-4.) "A cylindrical isolation element referred [sic] to as outer ring 10." (Frijlink, paragraph [0028], lines 1-2.) Frijlink further teaches:

> "...seal means are small grooves or roughened zones of surfaces of the interfaces of the isolation elements above-described. In the embodiment of FIG. 1, the seal means structures are applied to the flat contact surfaces of the outer ring 10 at the interfaces with the cover plate 20 and the base plate 30. The seal means structures according to the invention avoid the processing gases from

existing through said interfaces, and force said process gas through the outlets 12 and then through the exhaust plenum 29. These seal means do not allow those process gases to enter the spaces 102, 103."
(Frijlink, paragraph [0032], lines 1-11.)

Thus, Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle, as claimed in claim 1.

Also Frijink et al. does not teach a baffle comprising a first surface having a plurality of first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle, as recited in claim 1. In addition, Frijink et al. does not teach a gas distributor having a hub comprising a gas feed-through tube capable of allowing a process gas to bypass the first and second vanes and enter the chamber, as claimed in claim 9.

For these reasons, claim 9 is not obvious over Murugesh et al., in view of Halsey et al., and further in view of Frijink et al..

Claim 15:

The combination of Murugesh et al. and Halsey et al. and Frijink et al.. do not teach claim 15, as amended, which is to a substrate processing apparatus comprising a remote chamber to activate a gas and a process chamber comprising a gas distributor to distribute gas received from the remote chamber. The gas distributor comprises a hub comprising a gas inlet, a gas outlet, and a gas feed-through tube. The gas distributor further comprises a baffle having opposing first and second surfaces, which extends radlally outward from the hub, and has an outer perimeter. The baffle has first vanes on the first surface that each first vane comprises an arcuate plate that curves outward from the hub to the outer perimeter of the baffle, and directs the gas across the enclosing walls and interior chamber surfaces. Second vanes on the second surface of the baffle direct gas across the second surface of the baffle. The gas feed-through tube allows a gas to bypass the first and second vanes.

Specifically, Murugesh et al. does not teach a baffle having first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle. Instead Murugesh et al. teaches a baffle having a topography that is substantially planar, ridged, concave or convex shaped. A surface that is planar, ridged, concave or convex, is not the same as the claimed baffle having first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle. Specifically, Murugesh et al. does not teach or suggest arcuate plates curving outward from a hub of the baffle. Instead, Murugesh et al. teaches and shows triangular ridges on the baffle surface as in Figure 2A, or describes a planar surface or one which is concave or convex.

Furthermore, as acknowledged by the Examiner, Murugesh et al. does not teach second vanes on the second surface of the baffle, where the second vanes direct the received gas across the second surface of the baffle. As seen from Figure 2A of Murugesh et al., the underside opposing surface to the surface 251 with the ridges 245, has no ridges itself, and is a smooth surface. Thus, Murugesh et al. does not teach or suggest second vanes on the second surface of the baffle as claimed, and even teaches away from applying second vanes to the second surface by teaching that a smooth second surface is sufficient.

Halsey et al. fails to make up for the deficiencies of Murugesh et al. because Halsey et al. also does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Halsey et al. teaches a diffuser with guide vanes on the surface of one side of the diffuser and a smooth and flat surface on the opposing side of the diffuser. (Halsey et al., Figures 4A and 4B.) Halsey et al. also does not teach or suggest the claimed first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle.

Therefore, the combination of Murugesh et al. and Halsey et al. do not teach or suggest claim 15 as a whole, as neither of the cited references teach a baffle

structure comprising a first surface having first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on the first surface of the baffle, and a second surface having second vanes.

As presented above, Frijlink fails to make up for the deficiencies of Murugesh et al. and Halsey et al. because Frijlink also does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Frijlink teaches a process chamber with isolation means to prevent the reactive gases from flowing into spaces of the reactor other than the space immediately above the substrate holders and the wafers. Frijlink also does not teach a baffle comprising a first surface having first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle. Nor does Frijink et al. teach second vanes on the second surface of the baffle. In addition, Frijink et al. does not teach a gas distributor having a hub comprises a gas feed-through tube capable of allowing a process gas to bypass the first and second vanes and enter the chamber, as claimed.

The combination of Murugesh et al., Halsey et al. and Frijink et al. also do not provide any suggestion or motivation to derive the claimed substrate processing apparatus with the remote chamber and gas distributor recited in claim 15. The claimed gas distributor has first vanes comprising arcuate plates that curve outward from the hub to the outer perimeter of the baffle on one of its surfaces. The gas distributor also has second vanes to flow gas across the second surface of the baffle so that the gas flows uninhibited into the process chamber. The flow of gas across the second surface of the baffle cleans this surface, and thus, the gas distributor is self cleaning. This self-cleaning action is especially useful as the second surface is susceptible to the build-up of process residues. This is a significant advantage over prior art gas distributors which the combination of Murugesh et al., Halsey et al. and Frijink et al., simply does not provide any suggestion or motivation that would allow one of ordinary skill in the art to derive advantages of a gas distributor structure having first and second veins on opposing surfaces, as recited in claim 15.

For these reasons, independent claim 15 and the claims dependent therefrom, claims 16-19, are patentable over Murugesh et al. in view of Halsey et al. and Frijlink.

4. The Examiner rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. in view of U.S. Patent No. 6,663,025 issued to Halsey et al. as applied to claim 1 and further in view of U.S. Patent No. 6,132,512 issued to Horie et al..

Claim 10 is to a combination process and cleaning gas distributor comprising the gas distributor according to claim 1. The process gas distributor has a process gas inlet and a showerhead gas distribution faceplate. Claim 10 is dependent on claim 1, and is patentable over the combination of Murugesh et al., Halsey et al., and Horie et al., because the cited references do not teach or suggest the gas distributor of claim 1.

Murugesh et al. and Halsey et al. do not teach or suggest a baffle having the claimed first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Horie et al. fails to make up for the deficiencies of Murugesh et al. and Halsey et al. because Horie et al. also does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Horie et al. teaches "a gas ejection head for use in a vapor-phase thin-film growth apparatus, comprising a planar nozzle head body having a plurality of nozzle orifices for uniformly ejecting a film deposition therethrough." (Horie et al., Col. 4, lines 54-57.) Horie et al. further teaches:

> "...the gas injection head includes a nozzle head body 20 which comprises a disk 21 having a plurality of parallel fitting grooves 21a defined in an upper surface thereof and a plurality of parallel fitting grooves 21a defined in a lower surface thereof. The fiiting grooves 21a defined in the upper and lower surfaces of the disk 21 extend perpendicularly to each other. Slender liquid passage members 22, each having a channel-shaped cross section defining a liquid passage

groove 23, are fitted in the respective fitting grooves 21a defined in the upper and lower surfaces of the disk 21, with the liquid passage grooves 23 opening toward the bottoms of the fitting grooves 21a."

(Horie et al., Col. 8, line 59 to Col. 9, line 3 and Fig. 8A, 8B and 8C)

Thus, Horie et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle, as claimed.

For these reasons, claim 10 is patentable over Murugesh et al. in view of Halsey et al. and Horie et al..

5. The Examiner rejected claims 11-14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,182,602 issued to Redeker et al. in view of U.S. Patent No. 6,450,117 issued to Murugesh et al., U.S. Patent No. 6,663,025 issued to Halsey et al., and U.S. Published Application No. 2004/0200412 issued to Frijlink.

The combination of Redeker et al., Murugesh et al., and Halsey et al., and Frijink et al. do not teach claim 11 which is to a gas distributor to distribute a gas from an external source across surfaces in a substrate processing chamber having a wall with a cavity. The gas distributor comprises a hub that fits into the cavity in the wall of the chamber and a baffle plate extending radially outward from the hub. The hub comprises a plurality of first channels on an external surface of the hub that mates with the cavity. The first channels comprise openings and a terminus. The openings are capable of receiving the gas from the external source. The hub further comprises a plurality of second channels capable of receiving the gas from the terminus of the first channels, and a gas feed-through tube. The baffle plate comprises a first and second surface, an outer perimeter, and an aperture capable of allowing passage of the gas along the second channels. A plurality of first vanes on the first surface of the baffle plate, each comprise an arcuate plate that curves outward from the hub, and are provided to direct gas across the surfaces of the chamber. A plurality of second vanes on the second surface of the baffle plate, each comprise a surface inclined to the second surface of the baffle plate. The second vanes direct gas across the second

surface of the baffle plate. The gas feed-through tube allows the gas to bypass the first and second set of vanes.

As acknowledged by the Examiner, Redeker et al. does not teach a first channel along external surface of hub; a baffle plate extending radially outward from the hub, the baffle plate comprising a first and second surface, an outer perimeter, and an aperture capable of allowing passage of the gas along the second channels; a plurality of first vanes on the first surface of the baffle plate, each first vane comprising an arcuate plate that curves outward from the hub, a plurality of second vanes on the second surface of the baffle plate, each second vane comprising a surface inclined to the second surface of the baffle plate; whereby the first vanes direct the gas across the surfaces of the chamber, the second vanes direct the gas across the second surface of the baffle plate, and the a gas feed-through tube that allows the gas to by pass the first and second set of vanes.

As further acknowledged by the Examiner, Redeker et al. in view of Murugesh et al. does not teach second vanes on the second surface of the baffle and where second vanes direct the received gas across the second surface of the baffle.

Halsey et al. fails to make up for the deficiencies of Redeker et al. and Murugesh et al. because Halsey et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Halsey et al. teaches a diffuser with guide vanes on the surface of one side of the diffuser and a smooth and flat surface on the opposing side of the diffuser.

As presented above, Frijlink fails to make up for the deficiencies of Murugesh et al., and Halsey et al. because Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Frijlink teaches a process chamber with isolation means to prevent the reactive gases from flowing into spaces of the reactor other than the space immediately above the substrate holders and the wafers. Thus, Frijlink does not

teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle.

For these reasons, independent claim 11 and the claims dependent therefrom, claims 12-14, are patentable over Redeker et al. in view of Murugesh et al., Tzu et al., Halsey et al. and Frijlink.

CONCLUSION

For the foregoing reasons, allowance of the instant application is respectfully requested. Should the Examiner have any questions regarding the above amendments or remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,
JANAH & ASSOCIATES, P.C.

Date: November 13th, 2006

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